Chapter 1

Introduction

This book explores airline network development and airport planning in the deregulated EU air transport market. Three issues are addressed: (1) How airlines in Europe have reconfigured their route networks after the deregulation of the EU air transport market; (2) how these changes affect the airport hierarchy as well as the network quality of individual airports; (3) how changes in airline networks affect the strategic planning of airport capacity. The study not only fills a gap in the current body of academic literature with respect to these issues, but also provides airports with information about ways of dealing with increasing uncertainty resulting from changing airline network behaviour.

Let us first address the regulation and deregulation of the EU air transport market and the potential consequences for airline networks, the airport hierarchy and airport planning, then consider the aim of this text.

Regime changes

At the Paris Convention of 1919, following the First World War, the allied countries decided that nation states would have full sovereignty over their own airspace. Since that time, national governments have been strongly involved in the development of national and international scheduled air transport networks.

International air carriers such as KLM and Lufthansa depended on a portfolio of bilateral air-service agreements between the governments of their country of registration and of the destination country. The bilateral air-service agreements specified, for example, the traffic rights given to the operating carriers (including the gateways accessible to each carrier), the number of carriers operating between the countries or points within these countries, and the flight frequencies. Sometimes the designated airlines pooled the revenue and/or costs on a certain route. In practice, the designated airlines were the national carriers or flag carriers of each country.

From 1947 on, the International Air Transport Association (IATA) (the umbrella organization of the international airlines) set the ticket prices charged by the international airlines at the worldwide IATA traffic conferences. Frequently governments owned their national airlines, or subsidized them heavily.

In short, the trinity of the national government, the national airline and the national airport dominated the international air transport markets. Little room was left for competition in the air transport regime of bilateralism.
Since the end of the 1970s the international air transport regime has been characterized by continuous deregulation of air transport markets. This trend started with the deregulation of the domestic US air transport market in 1978. Many bilateral air-service agreements were liberalized during the 1980s and 1990s. The United Kingdom–Netherlands agreement of 1984 and the United States–Netherlands agreement of 1992 were the first examples of these ‘open skies’ agreements between European countries and between the United States and other countries respectively. In 1988 a first ‘package’ of deregulation measures marked the beginning of the full, multilateral deregulation of the EU air transport market, which was eventually completed in 1997.

As a result, airlines are increasingly free to allocate resources in both space and time. The system of bilateral treaties no longer imposes a strict framework for intra-EU airline network development. Airlines can compete freely on ticket prices, frequencies, route networks and service levels. However, much of the extra-EU network is still regulated by means of bilateral air-service agreements.

The regime changes in aviation have resulted in significant changes for airlines and airports. Close examination of the consequences of deregulation of the US aviation market in 1978 reveals three important issues that existing studies have only addressed in a limited way with respect to the deregulated EU air transport market:

- the reconfiguration of EU airline route networks
- dynamics in the EU airport hierarchy
- the consequences for airport planning and development.

Let us briefly consider these issues in turn.

**Airline network reconfiguration**

Various studies have concluded that the deregulation of the domestic US aviation market in 1978 resulted in two major network strategies. The first of these was the adoption and intensification of hub-and-spoke-networks by major ‘full-service’ airlines such as American Airlines and Northwest Airlines. The second major strategy was the adoption or intensification of point-to-point networks by low-cost, no-frills airlines such as Southwest Airlines.

The adoption of hub-and-spoke networks by airlines has certainly been one of the most imaginative, surprising and radical effects of the deregulation of air transport markets. After US deregulation a number of major US airlines dropped their point-to-point route structures and introduced hub-and-spoke networks instead. These are concentrated spatially around one or more hub airports where passengers can transfer to their connecting flights within a limited time window. At the hub the airline operates a wave-system structure to maximize the number of connecting opportunities. In a highly competitive market, hub-and-spoke systems offer an
airline the opportunity to benefit from certain cost and demand side advantages, to
deter entry, and to exercise some bureaucratic control over the hub airport.

Low-cost, no-frills airlines followed an entirely different network strategy
following US deregulation in 1978. Instead of the long-haul, high-yield and transfer
markets, they concentrated on high-volume routes by using non-hub and secondary
airports and offering very low priced, no-frills tickets. They preferred serving the
origin-destination markets with a point-to-point network structure to serving the
transfer markets with hub-and-spoke networks.

**Dynamics in the airport hierarchy**

Some studies have indicated that the adoption of spatially-concentrated hub-and-
spoke networks by US airlines has resulted in more inequality in the US airport
hierarchy. In other words, large airports, which are the home bases of major hub-
and-spoke airlines, have acquired an increasingly large market share in total traffic
(Goetz and Sutton 1997; Reynolds-Feighan 2000). The share in total departures of
the largest 3 per cent of US airports increased from 25 per cent in 1978 to nearly
40 per cent in 1984 (Wojahn 2001, 36). In addition, hub-and-spoke networks and the
freedom of entry and exit in deregulated markets are thought to have resulted in
declining levels of air service at small community airports. Competition and network
reorganization may focus on the larger airports, leaving the smaller airports with
reduced air service or even a loss of air service altogether (Dempsey 1990; GAO
1997; Reynolds-Feighan 1995).

Other studies (Chou 1993a) have argued that hub-and-spoke networks have had
the effect on the US airport hierarchy of reducing inequality. Traffic is in fact spread
increasingly evenly over the US airports. The network economies of hub-and-spoke
systems allow airlines to serve many more city-pairs than would have been the
case in a point-to-point network without such network economies (Button 2002).
Moreover, it is argued that the entrance of new airlines to the market induced the
spread of traffic over more airports.

To what extent do different types of airlines have the effect of increasing or
reducing inequality on the airport hierarchy? Such evidence is needed for the
assessment of the potential inequality-increasing effects of EU deregulation as well
as for the evaluation of the potential for future investments in airport infrastructure.

**Flexible airport planning**

The new air transport regime and the adoption of hub-and-spoke systems have
changed the context of airport planning. A major element of this new context is the
volatility (that is, the average year-to-year variation) of airport traffic.

The volatility of airport traffic tends to increase in deregulated markets. The
freedom of route entry and exit, the footloose nature of transfer traffic, the rise of low-
cost airlines and alliances have all led traffic volumes to become much more volatile
and uncertain (de Neufville and Barber 1991). Examples in the United States show how airlines can build and abandon hub-airports (Charlotte and Raleigh-Durham, for example) in a relatively short period. Low-cost airlines can boost ‘sleeping’ regional airports, as Ryanair did at Brussels Charleroi. The bankruptcy of a hub carrier can reduce transfer traffic at the hub airport to virtually zero, as the bankruptcy of Sabena at Brussels has demonstrated.

At the same time, airport master planning needs reliable long-term traffic forecasts: investments in airport infrastructure are long-term issues and the planning of future developments needs estimations of capacity requirements. However, the growing dynamics in airline network behaviour and the resulting volatility and uncertainty have made airport traffic much more difficult to forecast and airports may face quickly changing market circumstances.

There is a tension between a volatile market environment and airport planning. The highly dynamic network development demands flexibility, whereas airport master planning demands reliable forecasts and certainty. The challenge for airport planning is, therefore, to be sufficiently flexible to be able to deal with an increasingly volatile network environment. Airports that are not able to deal with volatility and uncertainty in a flexible way face significant risks in terms of overbuilding, under-building and mismatches between infrastructure use and supply.

In this study, we have constructed a framework of flexible airport planning, and applied the framework to a real-world airport planning case.

Objective

In contrast with the United States, the research on airline network development and the consequences for the EU airport hierarchy and planning is still somewhat limited in scope. It is not clear to what extent European airlines have adopted hub-and-spoke network configurations or point-to-point networks against a background of an entirely different urban geography, system of regulations, ground access and history compared to the United States. Nor is it clear how changing route networks in the EU have affected the EU airport hierarchy. Neither has the issue of airport planning under a free EU market regime been addressed systematically in academic studies. These issues are highly relevant from a scientific and societal perspective.

Hence the objective of this text is to assess and describe to what extent airlines have reconfigured their route networks since the deregulation of the EU aviation market, how these network changes have affected the EU airport hierarchy, and how airport planning can deal with the changing context of airline network behaviour.

The first part of this book deals with the changing network behaviour of European airlines. Chapter 2 addresses the theory of airline network behaviour. Chapter 3 describes the changes in the geographical structure of European airline networks. Chapter 4 is focused on the changes in the temporal structure (wave-systems) of European airline networks. We bring together the spatial and temporal structure of airline networks in Chapter 5. In Chapter 6 we illustrate the changes in European
airline networks by discussing a number of individual airline network cases, including KLM, Iberia, British Airways, Braathens and Air Berlin.

The second part of the book contains the analysis of the relationship between airline network behaviour and the network quality of European airports. Chapter 7 discusses the impact of the changes in airline network configuration on the distribution of seat capacity in the European airport hierarchy. In addition, we discuss the network quality of regional airports. The question is answered to what extent hub-and-spoke network development has been beneficial for the network quality of smaller airports at the downside of the European airport hierarchy.

The final part of this text addresses the issue of strategic airport planning in a highly dynamic air transport market. Chapter 8 surveys the requirements for a more flexible approach to airport planning. Based on these requirements, the strategic planning processed at Amsterdam Airport Schiphol is assessed in Chapter 9.